

and thunderstorms were reported generally in the middle and east Gulf States.

The rivers of the Sacramento Valley, California, continued at a high stage during the month. From the 1st to the 3d a slight freshet occurred in the lower Willamette River. From the 25th to the 27th floods were reported in the streams of Wisconsin, Michigan, and northern Illinois. At the close of the month the Genessee, Mohawk, and Chenango rivers, New York, were swollen by rain and melting snow.

CHICAGO FORECAST DISTRICT.

On the morning of the 4th cold wave warnings were ordered over the southern and eastern parts of the district in advance of a cold wave which developed over the British Northwest on the 3d. The cold wave was very severe for the season, and the information which was given to the public in advance must have been of great value. A number of severe storms passed northeastward from the Rocky Mountain slope over the Lake region. Warnings of the approach of these storms were issued well in advance to open ports on Lake Michigan, and were followed carefully by vesselmen, as no casualties occurred during the month.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

The month as a whole was rather free from marked disturbances, except in the extreme southern portion of the district. It was particularly fortunate that such weather conditions prevailed, inasmuch as the rivers of the Sacramento Valley, owing to previous warm weather, heavy rainfall, and the rapid melting of snow, were at an exceedingly high stage.—*A. G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

The storm warnings of the month were verified by gales on or near the north Pacific coast. The frosts and freezing temperatures in the eastern part of the district during the latter part of the month were, as a rule, successfully forecast. A slight freshet in the lower Willamette River from the 1st to 3d was accurately forecast.—*Edward A. Beals, Forecast Official.*

RIVERS AND FLOODS.

During the month much more rain fell over the Mississippi watershed than during February, 1901, and, as a consequence, the Mississippi River and its tributaries were decidedly higher, particularly during the latter half of the month. The breaking up of the ice in the upper Missouri and upper Mississippi rivers and the melting snows also largely assisted in augmenting the stages of the rivers. The rivers of Wisconsin and Michigan were in flood during the last week of the month owing to the general rains and the thaw from the 22d to the 24th, inclusive. Ice gorges formed in many places; the smaller streams overflowed their banks, causing much damage to low-lying property; dams were washed away; a large number of bridges was either materially weakened or else carried entirely away, and railroad tracks washed away in some places.

The rise in the Ohio was of immense benefit to the navigation interests, and it is said that about 10,000,000 bushels of coal left Pittsburg for southern points.

The Illinois River, at Peoria, Ill., was above the danger line from the 14th to the 31st, inclusive, but was not so high below.

The rivers of the Gulf and Atlantic systems were also much higher than during February. Those of North Carolina were near or above the danger lines from the 27th to the 29th, inclusive, while those of South Carolina were consider-

ably above. The usual flood warnings were issued twenty-four hours in advance. A warning of a 30-foot stage in the Savannah River, at Augusta, Ga., was issued on the 26th, and a stage of 29.6 feet was recorded on the morning of the 28th.

The following report on the moderate floods in the rivers of eastern Alabama and northwestern Georgia was prepared by Mr. F. P. Chaffee, Official in Charge of the United States Weather Bureau office at Montgomery, Ala.:

Heavy to very excessive rains set in over the upper portions of the watershed on the morning of March 25. Rome, Ga., reporting at noon that 4.41 inches had fallen since 8 a. m. Special 2 p. m. reports were immediately called for from all substations; which showed that up to that hour 1.36 inch had fallen at Canton, Ga.; 2.05 at Resaca, Ga.; 5.61 at Rome, Ga.; and 3.51 at Gadsden, Ala. Rome, Ga., was wired that a 26-foot stage was expected at that place by the morning of the 28th, warning issued for moderate flood stages at Gadsden and Lock No. 4, Ala., and for rapid rises at Wetumpka, Montgomery, and Selma, Ala., and advising that stock be moved from low grounds, and other necessary precautions taken. During the twenty-four hours ending at 8 a. m. of the 26th, 2.42 inches of rain had fallen at Canton, Ga.; 2.79 at Resaca, Ga.; 6.22 at Rome, Ga.; 4.41 at Lock No. 4, Ala.; and considerably less at points lower down, causing such pronounced 24-hour rises as 15.7 feet at Resaca, Ga., 18.4 at Rome, Ga.; 13.5 at Gadsden, Ala.; and 11.7 at Lock No. 4, Ala. Taking into consideration the fact that upon a previous occasion such excessive rains had given even more rapid rises in these rivers, additional warnings were issued for moderate flood stages at all points, except Wetumpka, Ala. The flood crest passed Rome, Ga., during the evening of the 27th, though, on the morning of the 28th, the rivers were still rising south of Wetumpka, Ala., and continued to rise slowly during the 29th; at 8 a. m. of this date, 33.0 feet was reported from Wetumpka, Ala.; 31 feet from Montgomery, Ala., and 31 feet from Selma, Ala. On April 1 moderately heavy rains occurred over the middle and upper watersheds; these rains started a secondary rise, which only slightly augmented the previous one, and a final forecast was then made for stages of 39 feet at Montgomery and 40 feet at Selma, Ala. The flood crest passed Montgomery on the 3d and Selma during the afternoon of the 4th.

The following maximum stages were reached on these rises:

Stations.	Maximum stage.	Danger line.
	<i>Feet.</i>	<i>Feet.</i>
Resaca, Ga.	25.8	25
Rome, Ga.	27.0	30
Gadsden, Ala.	32.0	18
Lock No. 4, Ala.	18.0	17
Wetumpka, Ala.	33.4	45
Montgomery, Ala.	37.4	31
Selma, Ala.	38.5	35

The warnings were widely disseminated by telegraph, telephone, and mail, and through the local press; this office has heard of no damage which a warning could have averted. Large areas of prepared land were inundated, and farming operations entirely suspended in the low grounds drained by these rivers.

Danger-line stages were not reached in the rivers of western Alabama.

Nothing of interest occurred along the rivers of the Pacific coast States, although the lower Sacramento River was above the river danger line of 25 feet at Sacramento, Cal., during the first seven days of the month.

Ice had moved out of all the rivers by the end of the month. At Albany, N. Y., on the Hudson River, the ice moved out quietly on the 22d and 23d without causing any damage. On account of the comparatively low temperature a rapid thaw was prevented, and the water was not sufficiently high to create any serious apprehension. On the 27th it was higher than at any time since the spring of 1900, but was only a little over the docks at that. On the 28th the upper Mohawk River was free from ice. The first boat of season arrived from Newburg, N. Y., on the 28th, and the first one from New York, N. Y., on the 29th.

In the Susquehanna River, at Harrisburg, Pa., the ice went out on the 11th, and at Wilkesbarre, Pa., during the night of the 12th.

In the Missouri River the last ice at Kansas City, Mo., was seen on the 1st, and the last at Omaha, Nebr., on the 16th. It went out at Sioux City, Iowa, on the 11th, at Yankton, S.

D., on the 10th, at Pierre, S. D., on the 14th and 15th, and at Bismarck, N. D., on the 31st, navigation being resumed almost immediately after the channels became clear.

In the Mississippi River the ice gorge at the Wabash Bridge, at Hannibal, Mo., broke on the 2d, and the river was free from ice on the 7th; at Muscatine, Iowa, the ice went out on the 15th; at Davenport, Iowa, from the 16th to the 20th; at LeClaire, Iowa, on the 17th; at Prairie du Chien, Wis., from the 24th to the 26th; at Dubuque, Iowa, south of the bridge on the 17th, and north of the bridge on the 23d; at La Crosse, Wis., in front of the city on the 29th, but not below the railroad bridge until the 31st, and at St. Paul, Minn., below Robert street bridge on the 24th, but not above until the 27th.

Dates of resumption of navigation were as follows: Grafton, Ill., 9th; Hannibal, Mo., 16th; Keokuk, Iowa, 24th; Davenport, Iowa, 25th, and St. Paul, Minn., 27th. Navigation on the Ohio River, above Cincinnati, Ohio, was resumed on the 5th after a suspension since February 12, caused by low water resulting from ice gorges in the river above.

A new special river station of the Weather Bureau was established on March 1, 1901, at New Madrid, Mo., on the Mississippi River, a part of the Memphis, Tenn., district. The new station is 70 miles below Cairo, Ill., 160 miles above Memphis, Tenn., and 1,003 miles from the mouth of the river.

The highest and lowest water, mean stage, and monthly range at 135 river stations are given in table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1, p. m.	50	97	4, a. m.	48	54	Miles. 2,075	Days. 2.5	830	34.6
II.....	6, a. m.	29	99	9, a. m.	32	61	2,050	3.0	683	28.5
III.....	11, a. m.	30	88	13, a. m.	32	64	1,500	2.0	750	31.2
IV.....	14, a. m.	51	104	20, a. m.	32	64	8,725	5.0†	745	31.0
V.....	20, p. m.	32	95	24, a. m.	32	64	2,050	3.5	588	24.4
VI.....	22, a. m.	38	123	24, a. m.	47	123	725	2.0	362	15.1
VII.....	30, a. m.	41	105	2, p. m.*	44	70	1,800	3.5	514	21.4
Sums.....							13,925	31.5	4,470	186.2
Mean of 7 paths.....							1,989		639	26.6
Mean of 21.5 days.....									648	26.9
Low areas.										
I.....	1, a. m.	54	114‡	6, a. m.	46	60	2,950	5.0	590	24.6
	3, p. m.	40	105‡				2,900	2.5	1,160	48.2
II.....	1, a. m.	30	90	2, p. m.	35	76	1,275	1.5	850	35.3
III.....	6, p. m.	48	123	9, a. m.	39	87	1,850	2.5	740	30.8
IV.....	8, p. m.	35	102	13, a. m.	48	54	2,900	4.5	644	26.8
V.....	9, a. m.	49	123	16, a. m.	41	72	3,100	7.0†	443	18.5
VI.....	17, p. m.	44	108	19, a. m.	28	88	1,350	1.5	900	37.5
	20, p. m.	37	79†	22, a. m.	48	69	2,900	4.5	578	24.1
	21, a. m.	33	115				1,000	1.5	697	37.8
VII.....	21, p. m.	50	110	30, a. m.	45	64	3,325	9.0	358	14.9
	23, p. m.	32	91				2,975	8.5	850	14.6
VIII.....	25, p. m.	32	100	28, p. m.	35	75	1,750	4.5	389	16.2
IX.....	28, a. m.	34	112	4, p. m.*	41	71	1,425	2.0	712	29.7
							3,500	7.0	500	20.8
Sums.....							32,800	61.5	8,881	369.9
Mean of 14 paths.....							2,348		634	26.4
Mean of 61.5 days.....									533	22.2

* April. † Stationary for 1 day.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Precipitation is expressed in inches and temperature in degrees Fahrenheit.

Alabama.—The mean temperature was 53.2°, or 2.0° below normal; the highest was 84°, at Florence on the 3d, and the lowest, 11°, at Oneonta and Riverton on the 7th. The average precipitation was 6.30, or 0.18 above normal; the greatest monthly amount, 10.14, occurred at Ashville, and the least, 1.39, at Livingston.

Farm work was almost entirely interrupted by excessive rains during the last few days, which caused overflows in nearly all the larger rivers, inundating much prepared land.—*F. P. Chaffee.*

Arizona.—The mean temperature was 54.8°, or 1.2° below normal; the highest was 95°, at Sentinel on the 1st, and the lowest, 5°, at Flagstaff on the 31st. The average precipitation was 0.52, or 0.43 below normal; the greatest monthly amount, 1.89, occurred at Camp Creek, while none fell at a number of stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 51.5°, or 0.5° above normal; the highest was 86°, at Conway and Spielerville on the 2d, and the lowest, 4°, at Pond on the 6th. The average precipitation was 4.67, or 0.25 below normal; the greatest monthly amount, 7.32, occurred at Ozark, and the least, 2.45, at Arkansas City.

Good progress has been made in all kinds of farm work during the month; early potatoes and some oats and corn have been planted; land is being prepared for cotton; wheat and oats continue to do well generally; the damage to fruit by frost has been slight.—*E. B. Richards.*

California.—The mean temperature was 53.0°, or 2.1° above normal; the highest was 95.0°, at Volcano on the 1st and at Salton on the 6th, and the lowest, 14° below zero, at Bodie on the 13th. The average precipitation was 1.01, or 2.32 below normal; the greatest monthly amount, 7.02, occurred at Crescent City, while none fell at 10 stations.

Conditions were unusually favorable for all crops during March. The temperature was slightly above normal, and no injurious frosts occurred. Light rain fell throughout the State, benefiting grain and grass, and softening the surface soil, which in some sections had become crusted. Wheat was in excellent condition at close of month, and deciduous fruits were developing rapidly.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 34.7°, or about normal; the highest was 86°, at Lamar on the 2d, and the lowest, 12° below zero, at Wagon Wheel Gap on the 30th. The average precipitation was 1.35, or about normal; the greatest monthly amount, 5.41, occurred at Ruby, and the least, 0.04, at Durango.

The consensus of opinion seems to be that the season is from 10 to 20 days late. The soil is generally in good condition, and some plowing and seeding have been done. Winter wheat is in good condition in the districts where water was available for irrigation last fall. Fruit trees wintered well in nearly all sections and the outlook for a good crop is favorable.—*F. H. Brandenburg.*

Florida.—The mean temperature was 62.1°, or 3.3° below normal; the highest was 91°, at Nocatee on the 25th and De Land on the 31st, and the lowest, 21°, at Quincy on the 7th. The average precipitation was 5.65, or 2.57 above normal; the greatest monthly amount, 11.23, occurred at Carrabelle, and the least, 1.65, at New Smyrna.

Heavy rains during the second and third decades retarded farm work, and low temperatures during the first and second decades damaged vegetables as far south as central counties. Freezing conditions obtained throughout the north half of the State. A great deal of corn has been worked the first time, and considerable cotton has been planted on uplands. Citrus trees and pineapples are vigorous. Farm work is about two weeks late.—*A. J. Mitchell.*

Georgia.—The mean temperature was 53.6°, or 2.0° below normal; the highest was 86°, at Waycross on the 25th and at Fitzgerald on the 30th, and the lowest, 6°, at Dahlonega on the 6th and 7th; the average precipitation was 6.18, or 1.10 above normal; the greatest monthly amount, 9.17, occurred at Rome, and the least, 2.34, at Savannah.

Violent electrical disturbances and local windstorms occurred on the 25th and 26th, causing considerable property damage and some loss of